



NASA'S NEAR EARTH NETWORK (NEN) AS3 ANTENNA DEPLOYMENT PROJECT

HOW WILL AS3 BENEFIT THE FUTURE OF THE AGENCY?

The need for a robust ground communication network is essential to the continued success of NASA's mission. The Near Earth Network (NEN) is the Agency's global ground-based network, responsible for connecting Earth-orbiting spacecraft with their data centers here on Earth. This global web of ground stations consists of a variety of large antennas placed in strategic locations around the globe to enable the greatest data capture possible.

Each NEN antenna offers customer spacecraft telemetry, tracking and command (TT&C) services. TT&C services are crucial to ensuring optimal spacecraft operations. Telemetry data can contain instrument readings that provide information about the spacecraft health – such as battery charge, amount of propellant, etc. Telemetry data can also contain scientific data, which is generally downlinked at higher rates than health monitoring data. NEN ground stations generate tracking data based off of their geodetic location on Earth. A NEN antenna will follow an orbiting spacecraft as it passes over the station to determine the spacecraft's orbital track over the Earth. This tracking data can help to identify which stations will have a view of the spacecraft and the time that it will be visible by the station. Lastly, NEN ground stations assist in the transmission of commands that help to maneuver the spacecraft while it is in orbit and in gathering its mission critical data. TT&C data is transmitted from a NEN ground station and received from orbiting missions simultaneously.

Each of the NEN's strategically placed ground stations - a majority of which are located in near-polar regions - are able to provide communication support for a series of high-data rate science missions. Many of these missions require daily, sometimes even hourly, contacts in their orbital and suborbital locations. This vital communication link captures data from some of the Agency's and its partners' most famous Earth and space science missions every day. For example, the NEN provides services to spacecraft that make up the Earth Observing System (EOS). EOS is a coordinated series of polar-orbiting and low-inclination satellites that are facilitating an improved understanding of the Earth as an integrated system. One of these satellites, Aqua, has six different Earth-observing instruments on board and is named for the large amount of information it collects about water in the Earth system. Aqua gathers this information from its stream of approximately 89

Gigabytes (GB) of data a day, and the NEN receives the downlinked data up to 15 times per day at a stream of 500 kbps.

On a daily basis, the NEN is retrieving downlinked Earth science data about the land surface, biosphere, atmosphere, and oceans, and space science data capturing live gamma-ray bursts or maps of the outer edge of the known the solar system. NEN antennas collect over 10,000 passes per month from nearly 35 spacecraft, all while maintaining a 99% data capture rate.

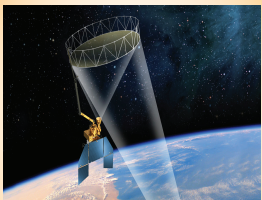
In order to maintain this level of excellence into the future and meet new customer requirements, the NEN is developing and deploying new ground assets – including the AS3 antenna. When deploying a new antenna, the NEN must take into account legacy communications requirements to maintain compatibility with operational missions, while also looking towards future mission communication requirements.

The AS3 antenna, which will be deployed over the summer months, has been designed with the Soil Moisture Active Passing (SMAP) mission communication requirements in mind. Since SMAP will be providing scientists with global measurements of soil moisture and its freeze/thaw state, it will need to be able to dump its collected data multiple times a day. AS3 will be available to receive SMAP's critical Earth science data up to ten times per day, averaging seven to eight 7-minute connections each day. This data will enhance our understanding of processes that link the water, energy and carbon cycles, and will extend the capabilities of weather and climate prediction models. SMAP data will also assist in quantifying net carbon flux in boreal landscapes and developing improved flood prediction and drought monitoring capabilities. Due to the spacecraft's orbital location, the AS3 antenna will be in a prime location to offer scientists on the ground greater opportunities to send/retrieve TT&C data for the SMAP spacecraft.

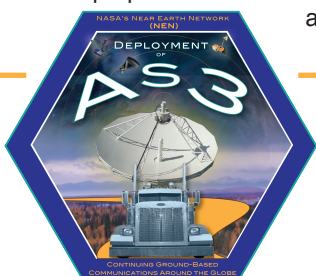
The deployment of the AS3 antenna enhances the NEN ability to meet its long-term network goals of reducing life-cycle costs and supporting higher data rates now and into the future.

The AS3 antenna will bring many years of continued communication support to the NEN customer base, and we want to share its progress with you! Over the coming months we will be sharing updates on the development and transport of AS3, as well as the ASF site transformation as we prepare for the installation of the NEN's newest antenna. We will be posting fun facts and graphics onto our social media sites and even taking you along for the ride as we transport this large antenna to the installation site. We may even play a little road-trip trivia along the way!

SMAP
SOIL MOISTURE ACTIVE PASSIVE
LAUNCHING: FALL 2014



NEN Resources: ASF, SGS, WGS, MGS & MTRS
NEN Services: S-band, X-band
NEN Service Levels: 1-3 passes per orbit
 4-11 min S-band, 5-9 min. X-band



Stay tuned for more information about the AS3 deployment project by visiting:

The NEN website: <http://esc.gsfc.nasa.gov/space-communications/NEN.html>

The ESC facebook page: <https://www.facebook.com/NASA.ESC>

And the ESC twitter feed: @NASA_GSFC_ESC